O.H. "Bud" Frazier interviewed by Donald A. B. Lindberg, March 31, 2010, Houston, Texas

Lindberg: Well, we appreciate you taking the time to meet with us, and part of the background, of course, is to develop a fuller understanding of Michael DeBakey, our iconic mutual friend, but of course you're well on your way to being an iconic master, yourself. So we don't want to neglect that aspect of the story. Tell a little bit -- you've worked with both sides of the street, haven't you? Dr. DeBakey and Dr. Cooley.

Frazier: Well, yeah, I started medical school -- actually, it was I went to the University of Texas to play football, and I got my hamstring muscle avulsed in spring training of 1960. I really never thought about what I was going to do beyond that, which I think a lot of kids today are sort of in that mode. Most in my era were not, but I was. I didn't want to be a schoolteacher. My parents were schoolteachers, and I knew I didn't want to be grading papers all the time, working for that.

Lindberg: What part of Texas were they from?

Frazier: Well, they were from what we call West Texas but it's more central, and my father taught at a college called Tarleton. It's a nice little school in a small town. It was really a very good place to grow up. I didn't appreciate it, of course, at the time, and my mother taught 7th grade English when she was at Tara. Everybody was afraid of my mother. She was 40 years old when I was born, which is very unusual in those days, and I had a sea of aunts around me.

Lindberg: You got to be a spoiled son then?

Frazier: Yeah, I never picked up a sock and I've made it to this point in life without making up a bed.

Lindberg: Good for you.

Frazier: But at any rate, I wasn't sure to do. My mother, anecdotally, is--she had driven down here. She was 82 years old. She had been driven down here from West Texas after my father died over the Christmas holidays. In between Christmas and New Years, she woke up in the middle of the night, and she clearly was having a heart attack. I took her out and said, "Mother, I want you to lay down in the back seat and I'm going to drive you to the emergency room." As I was backing the car out she said, "*Lay* down, *lay* down--all your education, all I've tried to teach you, and you don't know that I'm not a book or a pencil." That was her last punt. She tragically died a couple days later. But she wasn't going to let me get away with that.

Lindberg: That's good.

Frazier: But anyway, so I decided to go to medical school more or less on philosophic grounds, and I had to take all the pre-med courses in one year because I'd never taken a pre-med course. I came to Baylor, and I came here because of the -- well, actually a friend of mine was coming down here, and I had a girlfriend in Houston, so that was --

Lindberg: A combination of factors.

Frazier: --things you make decisions on at that point in your life. But the one thing we had was--and Dr. DeBakey started this--every student had to write a research paper every year, which was the most helpful thing to me in my medical education in medical school. I just by chance started out with the Department of Surgery working first year in transplants and the second year in the artificial heart with [Domingo] Liotta, and I wrote a short paper. We had to write a little paper on it. That was '66.

Lindberg: That was good fortune.

Frazier: Yeah, and I've stayed with it pretty much since then, and all of this started with Dr. DeBakey or, sorry, I started working with him in the research, because it was always in the Department of Surgery. But we had to have four and a half weeks at that time with Dr. DeBakey, four and a half weeks with Dr. Cooley in our surgery rotation. I always remember the only orientation we had to Dr. DeBakey was to get there early, because Dr. DeBakey always checked on the medical students and if you weren't in the room, he would really be upset at you. So surgery started at 7:30, and so you had to be there by 7:15.

[Frazier:] Well, the first case that I was to be in on was a lumbar sympathectomy. An operation they don't do much today but we did a lot of them then. But they didn't tell me they started that at 7:00, and Ted Diethrich was doing it, and I got to the room. Everybody was scrubbed. The patient was asleep, and Ted looked up and said, "Get in here. Dr. DeBakey has already been looking for you." There's Dr. DeBakey--when he's on the front page of Time Magazine, he's worried about where the medical student is. So I hurriedly scrubbed, and I got in there, and I was getting my gown on, and Dr. DeBakey comes into the room, at the door, and starts -- everything went to dead silence. He said, "You know, I wonder where--" --he had this sort of deep Louisiana accent when he was being informal-- "I just wonder where that medical student, Frazier, could be this morning?" And he was looking at me over the -- "I just wonder where he could be? You know, it's my understanding that he doesn't want to be a doctor at all. What he wants to be is a banker, a banker, and he can get up at nine o'clock every morning." So [there was] dead silence. Nobody said a word, and I was frozen, of course. And then he said, "Yes, I think that's what he should be. He would be a good Republican banker." And then he started laughing, which was probably the worst thing you could be in his eyes. And when he laughed, everybody laughed, so --

Lindberg: The ice was broken.

Frazier: And this was the case. Then later that morning--I hadn't learned how to deal with Dr. DeBakey very well by then--so I went to explain what had happened. I said, "Well, you know, I thought the case started at 7:30, Dr. DeBakey." And he was scrubbing at the sink. But it started at 7:00, and he said, "Well, you know, if you really cared, if you actually cared about the patient, you would have been here at 6:00. You see, if you were here at 6:00, then you could have seen the patient, shared his anxieties, seen what the anesthesia could do to help calm them, and you could have been with him, and you could have learned a lot, but of course you would have to care. Too bad, since you obviously don't care." He just wouldn't let you off the hook, but he was

a unique individual, and I think that's the best way to describe him. I've never seen anyone quite like Dr. DeBakey.

Lindberg: Well, what you describe is certainly part of team building, but I do recall a counter example, in which at least on one occasion he's quoted as saying, "I'm surrounded by incompetents."

Frazier: Oh, yeah.

Lindberg: Did you ever hear that? Get to hear that one?

Frazier: Yeah, sure. All those things were frequently accompanied by this heavenward gesture. "I'm drowning in a sea of incompetents." You know, he's looking up to the Almighty to somehow spare him with these idiots around him. "Drowning in a sea of incompetents." He had all these--we had one of the pioneers in electroencephalograms, Dr. Kellaway, and I remember him telling one of the residents one time, he says, "Call Dr. Kellaway in here and see if there's any evidence of brain activity in Dr. Jones here." He had all these things that were sort of funny if you weren't there, but at the time they weren't funny.

Lindberg: If you weren't the object of his attention.

Frazier: I went in one time to see one of his senior assistants a physician, younger surgeon like George Noon but not George at that time, and Dr. DeBakey was doing an abdominal aneurysm, and I went in and this man and his two assistants were standing in the corner. They were just standing in the corner of the room. He looked up at me, motioned me away, and Dr. DeBakey was doing the case with a nurse, and afterwards I went and I said, "Mac, what were you all doing standing in the corner?" And he said, "Well, Dr. DeBakey got so mad at us that he said he didn't need us at all. He could do the case with just the nurse. And we had to go stand in the corner until the case was over," you know, like they used to do with kids. And all these men in their 30s and early 40s out there standing in the corner until he'd finished. And he did it, you know, he could do those aneurysms by himself. Would have been interesting to get an honest answer from him, but I'm not sure whether he considered Dr. Cooley a blessing or not when he came, because Dr. Cooley was so slick technically.

Lindberg: Yeah.

Frazier: I don't think there will ever be anyone quite like Dr. Cooley. Nobody is going ever to be able to do 20 pump cases in a day.

Lindberg: That's incredible.

Frazier: Like Lindbergh flying that little plane across the ocean. There's not a pilot alive today that would do that. I think he [Cooley] was just unique technically, and Dr. DeBakey, certainly for the aneurysms, I think he did very well. I don't think -- cardiac surgery, he was sort of a late starter and that fine sewing -- he was -- but still I think he was a very accomplished surgeon, particularly when you consider all the other things he was doing at the same time. I think that's a

remarkable thing. There's a lot of good surgeons.

Lindberg: What was the other one?

Frazier: Well, taking a medical school that was as he described third-rate, and it was at least that when he came here. By the time I started in '63, it was generally considered the better medical school in the south, probably better than Tulane and Duke. And it didn't get there by magic. It got there because Dr. DeBakey just pushed it there, and he had a remarkable energy and remarkable focus. And yet on another level -- I mean he was frustrated with people around him. As I get older I can -- a lot of these temper tantrums that he had, I wish you could still get away with. He just kept that hospital always--I think it was the best hospital in the world in the '50s and '60s and '70s, because Dr. DeBakey wouldn't accept anything else. For example, I never saw a decubitus ulcer over there. Never. And I see them now all the time.

Lindberg: Really? It's nursing.

Frazier: Right, and he knew that, and at some point before I got there, Dr. DeBakey--the nurses knew that if they had a patient that got a decubitus ulcer, they would be fired. He would fire the nurse, and so the result was there were no decubitus ulcers. I mean it was just that sort of tightness of a system that he was able to engender. I think he had the best blood banker in the world, a guy named Migliori [phonetic] down there. About every two weeks he would go down -- we'd be making rounds -- he'd go down into the blood bank and start yelling at Migliori to do -- he was going to get rid of him if he didn't get the blood. He was the best guy in the world doing it, but he just never let up on anyone or himself. He really imbued in us the importance of trying to keep focus on the patient, to the expense of yourself and your own health. He wouldn't let you out of the ICU when you were in there. When I went in, the guy ahead of me, he fired after two months, so I actually had to spend four months in the ICU, so it was a world that unless you were there, nobody would believe it.

Lindberg: I guess, that means not as a patient but you were assigned there full-time and couldn't leave the hospital.

Frazier: No, you were assigned to take care of the patients.

Lindberg: And you couldn't leave, right?

Frazier: You couldn't leave, and the other thing he would do because he was such a stickler of grammar, and still when I was a medical student, so that was '65/'66, I guess I was rotating on his service. So at that time, he was in his late 50s. He would grade the papers and grade them mainly for grammar. If you abbreviated something or had something wrong grammatically, he'd call you in and sort of chew you out about your grammar. He was such a perfectionist.

Lindberg: Well, his standards were high, but I'm interested to hear you say that they infused the whole hospital operation.

Frazier: Yes.

Lindberg: He didn't stop with surgery. He worked the whole thing over.

Frazier: No, everybody was -- and I think again it was just a community hospital. I mean this is a medical center. I mean Houston was known for the oil industry and that sort of thing, but it wasn't known for medicine.

Lindberg: Yeah, not in those days.

Frazier: In 1948 and '49 when he came here.

Lindberg: Yeah, he told me he was the only surgeon in town with the boards [certification].

Frazier: Yeah, I think that's probably right.

Lindberg: Yeah, that's amazing. And the photos of this Texas Medical Center were essentially of a cow pasture.

Frazier: Yeah. Well, more a forest. We're on the edge of the east Texas forest. I had Olivia de Havilland's son as a patient one time, and I got to know her reasonably well just because of her son. I remember her telling me one time the most interesting thing to her in coming to Houston -- where she had only been temporarily in the past -- was that when you came in -- it was in the '80s -- it was all green. You'd see all these trees, and that's the way this medical center was, just sort of a forest here, and of course Hermann [Hospital] was the first built and then Baylor was the next building and that's 60 years ago it was nothing. I understand it's the largest medical center in the world.

Lindberg: Oh, it must be.

Frazier: For good or bad.

Lindberg: You haven't even stopped growing apparently.

Frazier: It's still growing. Yeah, it's amazing. It's like an institution is always the length and shadow of one man, and his shadow was quite a large one.

Lindberg: Marvelous man. I asked George Noon about Mike's work in Washington, and he said [they] knew nothing at all about it except they wouldn't be operating on Tuesday and Wednesday.

Frazier: That's it. He's right.

Lindberg: So that part of his life he didn't share with the surgical colleagues apparently.

Frazier: Well, I think he was so -- I don't know it's--one of the--Walker Percy was a writer from Covington, Louisiana. He was from Mississippi. He won the National Book Award, very good

writer, essayist. In one of his essays he was talking about the South and how it produced all these great writers. He would go to New York up to this Algonquin roundtable and discuss all these things with all these northeastern intellectuals, and they always were amazed that the South kept producing these wonderful writers, and they had this illusion, he reflected, that there just must be something that people down here are reading all the time, studying all the time, and he said, of course, he knew it was just the opposite. Nobody really cared and nobody read that much or cared what they did. William Faulkner was always just the peculiar Faulkner boy, lived up in Oxford, Mississippi. And he [Percy] lived in Covington, Louisiana, and he said in this essay that actually nobody knew exactly what he did. The Jax Beer distributor -- and there was one guy from Louisiana that played professional football--were much more well known than he was. Nobody--Covington didn't care anything about him [Faulkner], and in a way I think it was sort of that way here in that nobody really knew what [DeBakey] did, or cared. In some odd way maybe that was an advantage of being here, is he could do whatever he wanted to do. I mean nobody was up there stopping him. There wasn't a bunch of committees. It wasn't like an organized, structured medical school to be curious about what he was doing or he'd have to present anything. Just run as far has his legs would carry him. He was very good at getting the support of the community leaders. He told me that recently, three or four years ago when I was going up to Cleveland with him, the problem that Baylor was having then was the lack of leadership in the community, and he went--

Lindberg: Yeah, I believe that.

Frazier: --to the Brown brothers. He went to Ben Taub. He went to Mr. Cullen. He went to these people that were the community leaders, and he impressed on them that they wanted a first-class medical school, that he didn't want the guys that were just competing between Hermann Hospital and Methodist administrators. He didn't deal with them. He dealt with the community leaders. Houston was fortunate at that time they had some of these people of substance but of also vision.

Lindberg: Well, your remarks kind of lead up to the big break. I wouldn't feel right without asking you about the Baylor/ Methodist Hospital break.

Frazier: Well, St. Luke's, I guess. Oh, the most recent one?

Lindberg: Yeah.

Frazier: Well, I think so much of that had to do with failure of communication, as Cool Hand Luke said. It's just a failure of communication. But also I think one of the liabilities of -- and I'm not impugning the leadership at Baylor, but they just weren't familiar with the culture down here and what they could do and what they really shouldn't do and couldn't do, and I think down here in the South in general --

Lindberg: That's a Faulknerian tendency.

Frazier: Well, they were from the Northeast and in general everybody understates what they want here. You don't go in demanding 100 percent when you really will accept 50 percent. You just try to deal with them, and I think there was a lot of that problem with Methodist that was

engendered by the audacity to think they first of all wanted more or less to take over the hospital. Well, they couldn't take over the hospital and they shouldn't. And then, of course, they convinced some of the Baylor board members -- I think this is what Dr. DeBakey was referring to -- who really didn't adequately study the situation, that they needed to have their own hospital. Well, Harvard has never had their own hospital. Harvard's had the same relationship that Baylor has [with Methodist Hospital] with the Mass General and the Brigham. It was fine. They did need a good clinic, which they ended up getting, but they didn't need a hospital, and that's sort of one of the tragedies that I think toward the end of his life, I know it concerned him a lot, but I know he was--

Lindberg: It did concern him. He felt terrible about it.

Frazier: I think he had a certain amount of optimism that I hope will be justified. We'll eventually do the right thing. What's that Churchill said about the Americans? That they would always do the right thing eventually.

Lindberg: After they tried everything else.

Frazier: Yeah, you give them enough time, and I think that will probably happen here, but it's just painful, and I think a lot of it was frankly cultural. These guys sort of overstating their case, and assuming both of them came--the chief people involved came from medical schools that always had a university hospital, but it was part of their tradition. Penn, the oldest hospital and probably the first medical school, as you know, and the Strong Memorial, I think really was the first sort of academic hospital. But it just didn't work down here that way; that wasn't the culture. I don't know. I hope it will recover. I think the whole paradigm of medical schools as we discussed--I mean the financial base, having to start out on the financial base as Dr. DeBakey instituted of the clinicians revenue generating --

Lindberg: Supporting the hospital.

Frazier: --the revenues supporting the medical school. I think that was first done by Dr. DeBakey and at that time it worked great, because insurance companies were just coming in. The medical schools were doing the procedures and that sort of thing, but it was a house built on sand.

Lindberg: Is there a good relationship now between Baylor and St. Luke's?

Frazier: Well, it's the same relationship there always was, and I think, again, historically they had a relationship. We'd rotate over here as medical students. Two students out there -- Baylor medical students. They'd come over here. We have some departments that--our general surgery chief is also the Baylor chief.

Lindberg: Chuck Brunicardi.

Frazier: Yeah, and the head of the liver transplant program here is a full-time Baylor -- But that relationship is sort of a quid pro quid between the medical school and St. Luke's, which they always had that. They worked mainly at Methodist, of course, but they had the same relationship

with St. Luke's. They could come over here and -- Historically, I think Dr. Cooley was, of course, the -- here it was -- and part of Baylor. It was probably a little tighter relationship, but it's still what it always was mechanistically. There's no--Baylor doesn't run the hospital, and that's what Dr. Stein I think had envisioned was that again Baylor--they couldn't do it at Methodist, but they would do it at St. Luke's, and he made an important error. I think if--I remember him telling me that he dealt with administrators who alluded to certain promises that they would let Baylor play a stronger role, but he told me one time, he said, "You know, I have a lot of trouble with this bishop. He doesn't seem to be interested in establishing this stronger relationship, and I've never had trouble with the bishop at Methodist, but I had trouble with everybody else. But I said, "Well, this is an Episcopalian hospital. Do you know the meaning of the word Episcopalian?" He confessed he didn't. I said when you look it up in the dictionary it says "system ruled by bishops," and the bishop unfortunately he has the only ultimate vote, and it's like the pope as far as this hospital is concerned. People can say what they want to, but he has the ultimate vote, and it's unlikely he's going to turn it over to one of the few Episcopalian hospitals in the country, and one of the most successful to a former Baptist school. I think you're going to levitate before that happens." And he never really understood that either anyway, but hopefully it will work out.

[Frazier:] But I think one of the things that affected me is like so many things was just when I was under Dr. DeBakey's service, we would work up a patient, and then we would go with them to the surgery the next day, so we got to know the patients pretty well. I had this young Italian boy, he was 17, and he had severe aortic insufficiency, but he was otherwise a very healthy looking boy. He was a real nice looking boy, and he was there with his mother from Italy. He could speak English somewhat. His mother couldn't at all. I remember talking to him the night before. He was very cheerful and optimistic. He had this huge [indiscernible]. He had a big huge heart, and you know that valve surgery was very high risk in those days and Dr. DeBakey --

Lindberg: But essential, though, because he had six months or so to live.

Frazier: Yeah, I'm sure of it. But Dr. DeBakey put in a Starr-Edwards or his valve, which was a similar valve, and a ball valve, and he did pretty well. I was on the surgery, and Dr. DeBakey was obviously very--he was Dr. DeBakey. But the surgery went well, and he was in the ICU later that evening, and about six o'clock that evening he arrested. In those days and what you still do, actually, immediately after surgery we opened the chest, and we started massaging his heart, and I was still the youngest and strongest and in the best condition, so I ended up massaging his heart. It was fibrillating, and I would massage the heart and they would shock it, and they couldn't get it going, but as I was massaging his heart -- I don't know if this has happened to me before or since, but I think this was the first time it had happened to me. The kid woke up. I was massaging his heart, and he was looking up and his hand came up trying to get up, and I thought -- and he was looking up at me, and I thought were we going to be able to get this thing started, but we couldn't. Finally, Dr. DeBakey came in he said we had to quit and he left. I was 25--

Lindberg: It's terrible. You're very close.

Frazier: He was looking up at me, and they finally sedated him, but he actually reached up and finally the resident just sort of knocked me aside. I remember his mother crying and crying. But I thought at that era if my hand could keep him alive, why couldn't we develop something that

could at least do what my hand did. And really from that time I went through my training, of course, and it always involved surgery, but mainly I was interested in research and developing these pumps. That's really the main reason I came over here with Dr. Cooley. I worked with both of them as a medical student, as an intern. But I was in Vietnam when the great breakup [between DeBakey and Cooley] occurred. When I came back, of course, [Domingo] Liotta and [William] Hall and all those people were gone. There was no [artificial heart] program left at Baylor, because it had dissolved. Dr. Cooley had started a program over here with Jack Norman.

Lindberg: Oh, Jack, yeah, I remember him.

Frazier: And he came down and so that was the only sort of device research going on. That was the main reason I came over here to finish my cardiac training. We worked and worked on it. It was very high mortalities in the '70s, very high in the '80s. I did--the first 23 implantable LVADs were done here. They finally in the early '90s at Cleveland Clinic and Columbia started on them, and all the pumps that are being widely used today started here. What they call the HeartMate II is an extension of the Hemopump, which was a continuous flow pump. I was always interested also in a continuous flow pump support because, of course, you could make them much smaller. But you can also make them much more durable. It occurred to me just from a teleologic standpoint as a medical student that the only organ that really needs a pulse is the heart for diastole. The other organs really basically at the capillary level its pulses flow anyway. So I was able to develop the first implantable pump. I don't say--well, because I'm not an engineer. I don't even like math, you know. I never liked it, but I've always worked with these--

Lindberg: How did you cure the hemolysis?

Frazier: I don't know. The first pump to be successfully used was, of course, the Hemopump, and it was done in 1986 at the contractor's conference in Louisville, Kentucky. [Robert] Jarvik, who had been fired by the Symbion company came, and I'd known him a long time, he came to me. I would go to these meetings, and I was getting in debates with Glen Pennington and Peer Portner and these other people in the field on pulseless versus pulsatile flow. They knew I had an interest in it, and both of them came to me at that meeting and Rich Wampler, who I didn't know very well, had a very small pump--it was the size of the eraser on a No. 2 lead pencil. He [Wampler] wanted me to do some research on it, and I saw it, and I said, well, "Rich, yeah, we can do that but I'm telling you it's going to hemolyze and it's just going to thrombose." Then Jarvik came to me with an implantable version of the same thing. That was really the first implantable continuous flow pump Dr. Jarvik started working. I started working on this with Rich Wampler, and we did some calves down here. It didn't hemolyze. This was '86. Things were a little simpler then. So in '88, we had enough data we could put it in a patient. There's a thing on the wall out there about that first patient, and it didn't hemolyze. Morbidly ill, [his] heart was hardly moving. He was suffering rejection after a transplant. We were able to reverse the rejection and he lived another ten years. We did four patients, and I presented this at a meeting, and I was amazed that there was no hemolysis. At this meeting I presented these four patients that had survived, and I said, "It's amazing that this pump is rotating at 2500 rpm, and it doesn't cause hemolysis." And after the talk--Rich Wampler was in the audience--he said, "Bud it's rotating at 25,000 rpm."

Lindberg: Yeah, I thought so.

Frazier: "You're logarithmically off." And the first thing I said nearly spontaneously, I said, "You know, Rich, if I'd have known that, I would have never tried this!" It was just something that was sort of fortuitous.

Lindberg: Pretty damn amazing.

Frazier: I would have never done it, and I don't know anybody else that would have been interested in it, and it's like Columbus miscalculating the circumference of the earth. If he hadn't miscalculated, he would have never thought that he could reach the Indies going west. I asked Rich Wampler the same question. I said, "Why do you think it doesn't hemolyze rotating at that speed? It should be like a Waring blender for blood," and he said, "I don't know." I thought he had some sort of dynamic thing that he'd figured out that wouldn't hemolyze. He just wanted to try. Dr. DeBakey and I both spontaneously when asked--I was asked that question one time. I said I think it's just like that trick you do when you're a kid where you scare your brother or sister by passing your finger through a candle. It just doesn't stay long enough to affect it, and it's about the only explanation.

Lindberg: Well, Mike attributed some contribution of NASA to, I guess, changing the edges of those impellers.

Frazier: Well, yeah, in some ways I think--he was such a brilliant man. He had a good understanding also of engineering, and he actually got into it later than he would like. I mean Dr. Jarvik had already done a number of animals here and had done--this Hemopump work had already been done. Of course, he knew this man at NASA, and I think he certainly contributed to the pump. The problem with the pump and the reason it's not used--and this is sort of a--he would speak to me, but not regularly and he still considered this sort of Dr. Cooley's program, which it was. He didn't ask me anything about the design of the pump and how it would interface biologically. They really didn't have any medical advisors that had any experience with it but they made the inlet cannula too long. In my opinion the pump itself is a great pump, but the inlet cannula was too long, it has to generate so much negative pressure that it results in platelet activation, which they studied.

I knew from the '70s that's why the Jarvik pump we put inside the ventricles so there would be no inlet cannula. There's advantages and disadvantages to that. The HeartMate II is right next to the heart so you don't have that platelet activation and the clots and the strokes that they got, so eventually sort of terminated the program. But the pump itself is a good pump. It's a very good pump, and it's smaller than the other pumps.

Lindberg: I was amazed at how small. It's like a thumb-size thing.

Frazier: Yeah, and his is smaller than what we call the HeartMate II, which is the pump that's most widely used today, which again it started here in our lab. We started that pump, the initial research on that.

Lindberg: Does NIH, have they returned to support of the artificial heart or are they still--

Frazier: No, they--I think--of course, Claude Lenfant was sort of reluctantly involved from the start.

Lindberg: Well, he was trained as a surgeon himself.

Frazier: Yeah, I know. But hell hath no fury like a Frenchman scorned. When he came here, if I talked to him more than 15 or 20 minutes, he'll start telling me about the time he took [Willem] Kolff his design for an artificial heart. He was interested in artificial hearts.

Lindberg: Yes, I thought so, too.

Frazier: He was like in his late 20s or early 30s, and he went to Kolff, who was clearly the leader in the research and had already done some experiments on animals. I think he was the one that said--he came in and met Kolff--Kolff was sort of a curmudgeonly guy himself.

Lindberg: Yeah, a tough old Dutchman.

Frazier: And he said this is what I think of your work.

Lindberg: Oh, that's nice.

Frazier: I think Lenfant must have embellished it to some degree, but he certainly didn't accept it, and he --

Lindberg: Be better to be called an incompetent.

Frazier: Yeah, he really I think was always sort of against it. There was so much interest in it at the time that I was appointed to the NHLBI Advisory Council. I was much too young to be on it. I was in my 40s. Everybody else was at least in their 60s. The only other surgeon on it was Dr. DeBakey. I went to the first meeting in January of '85, and the head of the HEW at that time was a Reagan appointment, and I've forgotten her name. It's sort of an odd name. She was from Boston, a nice--

Lindberg: Oh, yeah, Margaret Heckler. Yeah, Maggie Heckler.

Frazier: She [M. Heckler] came and gave a talk. Well, first of all, I went to the first meeting. They had a reception there and Dr. DeBakey didn't speak to me, because he hadn't spoken to me since I left and went to work with Dr. Cooley. It's ten years. This Heckler gave a nice talk and in the course of it she said that she'd just come from Louisville, where she saw the greatest achievement of NHLBI, the Jarvik heart. Well, of course, NHLBI had nothing to do with the Jarvik heart, and Lenfant, I think, nearly fell out of his chair. At that meeting he asked me to come up with a recommendation for what the NHLBI should do in the artificial heart field at the next meeting. That was in January. The next meeting was in May. I worked out this presentation to all of the faculty of the NHLBI and there were about 300 people there, and I basically recommended that they have a pump that the patient could walk out of the hospital with. It

couldn't be bound to this huge pneumatic drive system and that was durable and quiet and you could power it either from inside the body. We were still looking at plutonium for that, or you know through the skin.

Lindberg: Yeah, Jack Norman was an enthusiast for atomic power.

Frazier: Yeah, we did a lot of that. Anyway it was a very well received talk and eventually that's what resulted in the AbioCor. It was the funding for that. That's how it was developed.

Lindberg: Was that developed with Heart [and] Lung [Institute] money?

Frazier: Yeah.

Lindberg: I didn't know that.

Frazier: Yeah, it was developed by them and, of course, initially there were four programs like they always had four programs. Then they went to two and then AbioCor was the only one left standing. But after the talk, I remember I was talking to a guy named Ralph Nachman who was a hematologist from Yale -- nice guy, again some years my senior -- and everybody was very congratulatory. Lenfant was very impressed and that sort of thing. And Dr. DeBakey comes up to me. He hadn't spoken to me in ten years. And I was talking to Nachman and Dr. DeBakey just comes up and he says, "You know, Bud, that was a very inadequate presentation. You left out some of the most important points about the blood/biomaterial interface." Well, I only had 30 minutes, so I couldn't cover everything. I knew what he was talking about and that's always been a big theme of his, and I didn't respond to that. Then he said, "You know, Bud, inattention to detail is the hallmark of mediocrity." Which was another one of his sayings.

Lindberg: That was in case you weren't listening.

Frazier: "Inattention to detail was the hallmark of mediocrity," and he walked away. And this guy, Nachman, he was appalled. He said, "Bud, I've never heard a professional man speak to another professional man like that. You gave an excellent talk. It was the first time I ever really understood the problem." And I said, "Ralph, don't worry about it. Don't worry. He was being nice. That was as nice as he gets." And he always spoke to me after that. It was interesting. Every time I saw him, he would come up and discuss things. I always had a good relationship with him in that regard, and I think he began to appreciate the--and I would say anytime anybody asked me that I got involved in this field because of Dr. DeBakey and because of the enthusiasm he imparted and this terrible problem with the -- like the Italian boy. And it's very rewarding to me -- let's see. There's a picture. See that young girl over there?

Lindberg: Yeah.

Frazier: She was a very nice young girl. She came here about a year and a half ago with a cardiomyopathy, and I was massaging her heart when we went to the operating room, and we put her on the heart/lung machine, we put a pump in, and she is getting married next month, and she's still on the pump. She's still doing fine; and so from the Italian boy to her it's been a long

struggle, just personally with myself; but to realize that we were able to accomplish that so this young person who was just starting out in life has a chance to see three score and ten when a young boy didn't, and I think that more than transplants--I've done probably more transplants that anyone in the world but this to me is the greatest personal thing I've done.

Lindberg: This is the future. I think resting myocardium through the use of these VADs is a very sensible thing. This bridge to transplant is just sort of a legalism.

Frazier: Right, yeah. Will you hand me that picture? This is a man who's a PhD in Fort Worth at Consolidated working on the jets and things, really nice man, and he knew enough about transplants--because the discouraging thing to me about transplants -- it's a wonderful therapy for a patient group, but the mortality with time is really there. And you've got about a 10 percent 20-year survival, which is alright if you're 60 when you have it, but if you're 20 when you have it, it's not or you're 30--he was about in his early 30s, and he knew that I had always been an advocate of resting the heart, trying to remove it, and he nearly insisted that I try it on him, and he's the first one I took this HeartMate II out of, which I do think that's going to be the most important contribution--is that not that it normalizes heart function but it improves it if they go from an ejection fraction of 10 percent, which is what his was, to 45 percent, you can treat those patients medically for years and years.

Lindberg: Yeah, that's great. That's a big step up.

Frazier: And that's what we did with him. He was the first patient. We've had 11 since then -- I'm in the process of writing it up as you can see, but--and I've discussed it and presented it because I do think that's going to be its main use. Another decade, that will be its main use, to try and get these patients to a point you can take the pump out and then treat them medically if you have to, and maybe just again like remissions in cancer. Think what we do.We induce sort of remission of the heart failure. If that remission is going to last more than five years maybe you can wean them off it. I don't roll the dice. This is his baby he had after we removed the pump.

Lindberg: That's great.

Frazier: He named -- the baby's name is Douglas Frazier Shockwyler [phonetic].

Lindberg: Wonderful.

Frazier: So anyway I think he's very representative, I think, of what has the potential most far-reaching consequence. I think these pumps will certainly last five to ten years, but still the best thing, particularly the younger patients with idiopathic myopathies, is to get rid of these pumps altogether. Dr. DeBakey was always interested in that. And I think my great debt to him is he gave me a path to do something meaningful with my life.

Lindberg: And you've done it.

Frazier: I'm sure I wouldn't have had that opportunity without him.

Lindberg: Any progress in finding out what's causing the myopathy to begin with?

Frazier: No. I mean to me that's like having an alcoholic aunt in your family or something. You go to all these heart failure meetings and all the cardiologists and researchers, they'll talk about the treatments. They'll talk about the LVADs now. The International Heart and Lung Transplant Society is going to meet in Chicago this year. Over half the presentations are going to be on pumps and mechanical assists, but no one is saying what's causing this. What can cause a normal healthy young girl that was on the rowing team at Texas A&M to suddenly come in with this huge heart that's taking up her whole cavity and there's no -- sort of virus. To me a virus is just the thunder god of modern medicine. If you don't know what it is, you call it a virus.

Lindberg: Yeah, I agree. When I started medical school there were three things we didn't understand at all. The first was is what makes this myocarditis idiopathic, and I figured, well, it is virus. They'll figure that out in time. And the other two were whether it was worthwhile to have careful control of diabetes and it took awhile, but we know the answer there, and the other was can you treat breast cancer with radiation. So those two got answered. Those seemed like the tough ones, and the myocarditis we're still waving our hands about.

Frazier: Yeah, we're still trying to impugn the virus and it may well be. To me again we may not know the cause. That's one of Dr. DeBakey's favorite things. He was chewing out -- it wasn't me -- actually, a young staff member of his was complaining that he couldn't get the potassium up on this patient. He was hypokalemic, and Dr. DeBakey in his wonderful way said, "You know, I don't care how you get the potassium up. I don't even care why it's down, but you get it up. Get it up, and that's that. Fix the potassium. Give him some potassium." Fortunately, to me there's a certain statistical incidence that does point to--of course, the other thing that everything is is genetics at some level, but I'm sure there's some role of that.

Lindberg: Do you have an opinion about stopping the use of atomic power for powering these hearts?

Frazier: Yeah, I think that's what we'll do. I mean, the plutonium--like these continuous flow pumps will last indefinitely as long as they're spinning. We haven't had a pump failure. None of the pumps have been pumped to failure, so the only problems we've had is with the communication to the power source and the power source. And all that work we did in the '70s -- we had these plutonium sources that are about this size or a little smaller, about like that, that you could implant, and they would last nearly indefinitely, and I think when we combine that with the continuous flow pumps that have more or less indefinite lifetime we'll really have a meaningful total cardiac replacement. I don't think it will apply to a lot of patients, because I think most of them -- the other thing that's going to happen is that most of the hearts will get better with time.

But still the severest damaged ischemic hearts, the acute VSD infarcts, all these problems, we're not going to -- we'll just have to replace it in some way. I think that's -- and the technology is out there. We did all that work. We know its durability. The real concern was as I'm sure you'll recall, the increased malignancy that it may impart, all that radiation, but Parsonnet wrote this nice paper about ten years ago following all the plutonium pacemakers, all the nuclear

pacemakers, and there was no increased incidents of malignancies in the long term, so that seems to be put to rest. The other was still at that time maybe somebody could steal enough from patients to make a bomb out of them, but I think that's pretty unrealistic also. So I think it's something we should get into again.

Lindberg: I do, too.

Frazier: Have to take a younger man to start out and say, hey, why can't we power this with plutonium?

Lindberg: By the way, have you identified that young man yet?

Frazier: I haven't. I'm discouraged somewhat that--I don't know, I think most of the students we have now are a little more--they have a little better passions. Man is only as good as his passions, and if your passion is just to make money, well maybe you'll make a lot of money, but it's unlikely that in itself is going to--as a primary goal is going to be something meaningful. It can be a secondary goal, to actually doing something, but I think more and more these--

Lindberg: I have to confess, I find medical students better motivated in year one than in year four. I think we have to fix the medical schools, not the medical students.

Frazier: I think the system has gotten so bizarre with this continual testing and all of these things are real retrograde stuff, and I think they need to focus more on patients and what we're supposed to do.

Lindberg: Hear, hear.

Frazier: Take care of the sick.

Lindberg: Well, thank you. I'm so grateful to you.

Frazier: Anyway, well, I appreciate you coming by.

Lindberg: We've gone from the distant past to the real future.

Frazier: Yeah, it's been quite a journey.

But I think both Dr. Cooley and Dr. DeBakey influenced me personally a lot, but in a lot of ways, Dr. DeBakey pounding on you--but the concept--he always--was the great statement: "what man can conceive, he can achieve," and it's a little farfetched, but there's a lot of truth to it. You have to have the goal, otherwise you'll never go anywhere.

Lindberg: Absolutely. Both you and George Noon as medical students got into the research lab. I think that's the critical contribution. And I wish they would start that again.

Lindberg: No reason in the world they can't be in the research lab.

Frazier: That was--of course, we only had like 75 or 80 students to a class and that helped, but I don't see there's any reason they can't do it.

Lindberg: Right, and not everyone will have that impulse or talent, but at least some.

Frazier: Yeah, some of them should. I mean, it was required of all of us. I don't think that's necessary, but it should be available to all.

Lindberg: I couldn't wangle my way into a research lab at Columbia Presbyterian for anything even though I had done research at Amherst for years before that. It just simply wasn't part of the medical curriculum.

Frazier: Yeah. We had Tuesday afternoon and Thursday afternoon off our first and second years just to work on our research program.

Lindberg: That's great. Well, that's the only way. You've got to provide some time.

Frazier: Yeah, and as I said, to me it was clearly the most valuable thing to me as a student.

Lindberg: Well, now we've solved the problem of medical education as well as all the rest.

Frazier: That's right, yeah.

Lindberg: So I'm indebted to you.